WHILE WE'RE WAITING, PLEASE FILL OUT OUR RESEARCH SURVEY!

https://ubc.ca1.qualtrics.com/jfe/form/SV_3pUvzj8m6QBgjJ4

MINI MED SCHOOL EXERCISE SERIES

Talk 2: Cardiovascular Disease and Diabetes

JULIA DE PIERI, BSCHK, UBC MD CLASS OF 2024

a place of mind
THE UNIVERSITY OF BRITISH COLUMBIA
Faculty of Medicine

University of Victoria

let's talk science

TERRITORIAL ACKNOWLEDGEMENT

I would like to begin by acknowledging that I am joining you from the unceded territory of the Coast Salish Peoples, including the territories of the xwməθkwəy̓əm (Musqueam), Skwxwú7mesh (Squamish), Stó:lō and Səl̓ílwətaʔ/Selilwitulh (Tsleil- Waututh) Nations.

I would also like to acknowledge the Lekwungen peoples on whose traditional territory the University of Victoria stands and the Songhees, Esquimalt and Wsanec peoples whose historical relationships with the land continue to this day.

DISCLOSURE

I am a medical student. These talks do not constitute or substitute for medical advice. Please consult with your healthcare provider before making any modifications to your current treatment plan.

PLEASE, don’t stop your medication, but feel free to start exercising ☺

TOPICS

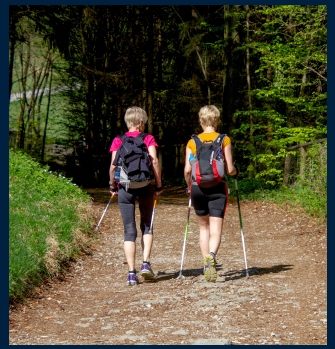
- Cardiovascular Disease
  - Dyslipidemia
  - Atherosclerosis
  - Heart Attack
  - Heart Failure
- Hypertension
- Stroke
- Diabetes

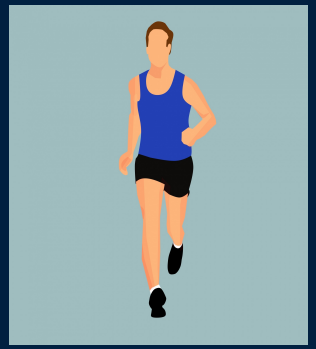
AEROBIC EXERCISE

Aka ”cardio”

Any form of exercise that will lead to cardiovascular (heart) improvement.

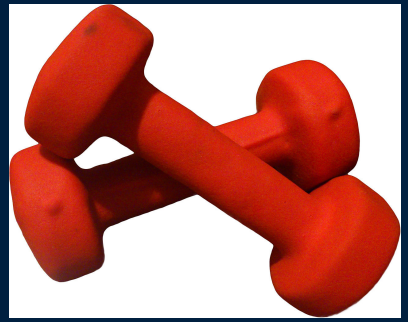
Your heart rate and respiratory rate will increase!





RESISTANCE/STRENGTH EXERCISE

Any form of exercise that will increase muscular strength and endurance.



FLEXIBILITY

Aka ”stretching”. Goal is to lengthen your muscles.

CARDIOVASCULAR DISEASE

POLL:

How many of you are on a medication that is meant to prevent serious cardiac events (ie. hypertension meds, statins, warfarin etc)

a) Yes

b) No

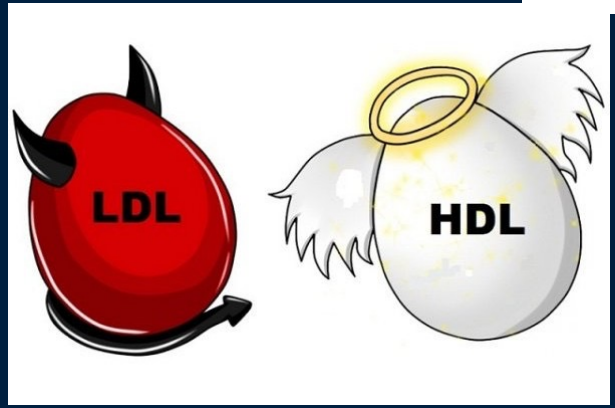
FOLLOW UP POLL:

If you are on a medication, how many of you engage in exercise as an additional preventative measure?

a) Yes
b) No
c) I’m not on any medication, but I exercise
d) I’m not on any medication, but I don’t exercise

DYSLIPIDEMIA

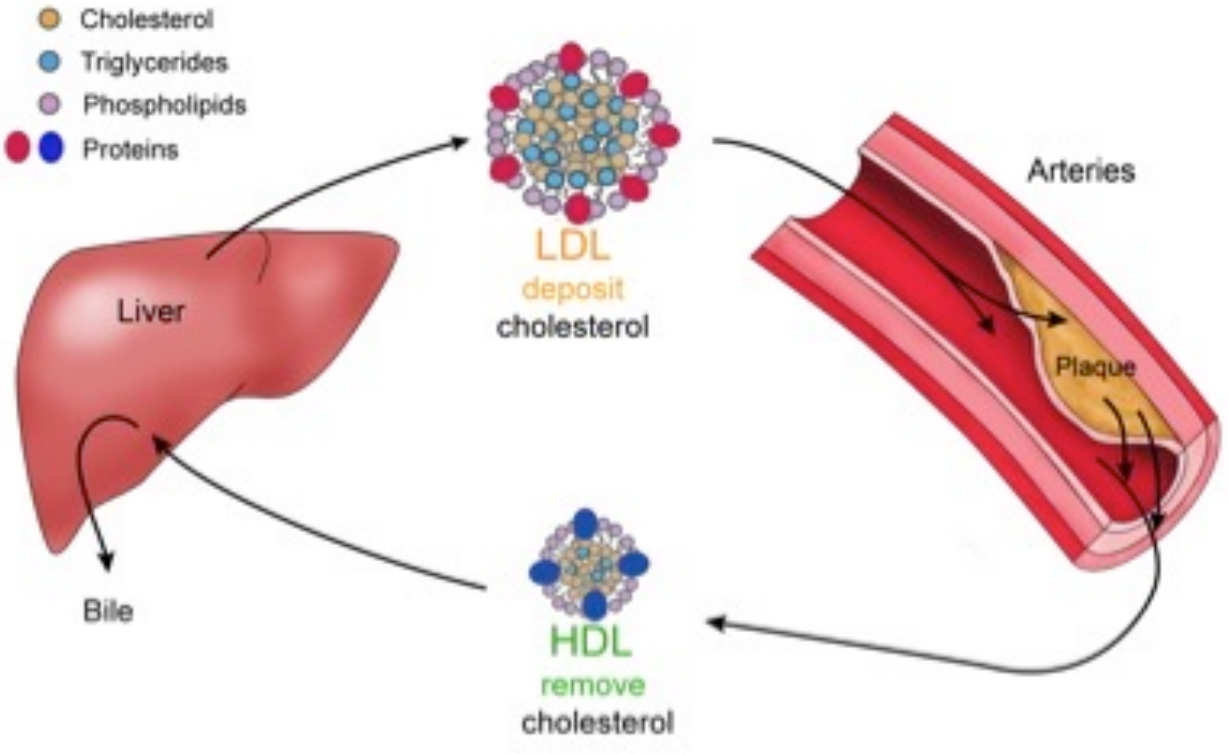
An elevation of plasma LDL cholesterol, triglycerides or both, or a low HDL cholesterol level that can contribute to the development of atherosclerosis.



LDL = low density lipoprotein

HDL = high density lipoprotein

WHAT HAPPENS IN YOUR BLOOD



CAN EXERCISE IMPACT DYSLIPIDEMIA?

YES!

- When you exercise, your muscles need fuel.

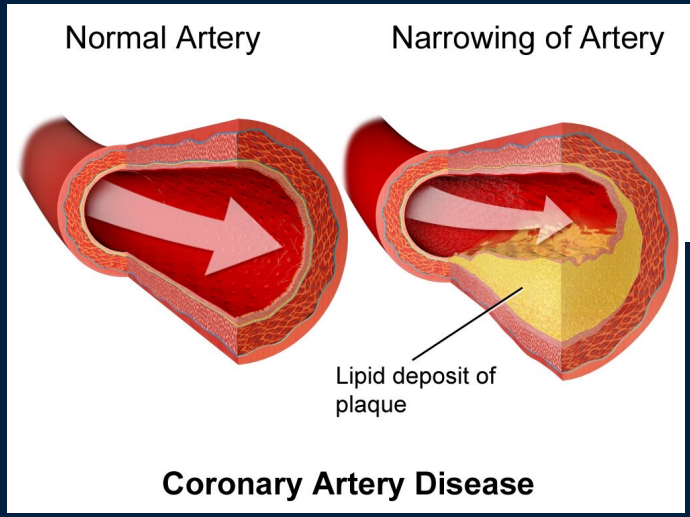
- Exercise increases your body's ability to choose lipids as fuel → reduces lipid levels in the blood

- Aerobic exercise helps increase HDL (good) cholesterol while reducing triglycerides and LDL cholesterol

- Structured resistance exercise seems to show the same results

ATHEROSCLEROSIS

A buildup of plaque within the arteries that can cause the arteries to harden and narrow. This can lead to reduced blood flow (and associated symptoms) or plaques can rupture and cause heart attack and stroke.



CAN EXERCISE PREVENT CORONARY ARTERY DISEASE?

YES!!!!

- Helps modify risk factors: hypertension, diabetes, obesity, dyslipidemia…..it keeps going ☺

- Improves blood vessel function (prevents atherosclerosis onset)

- The more intense the better? But anything is still better than nothing (Harvard Alumni Study).

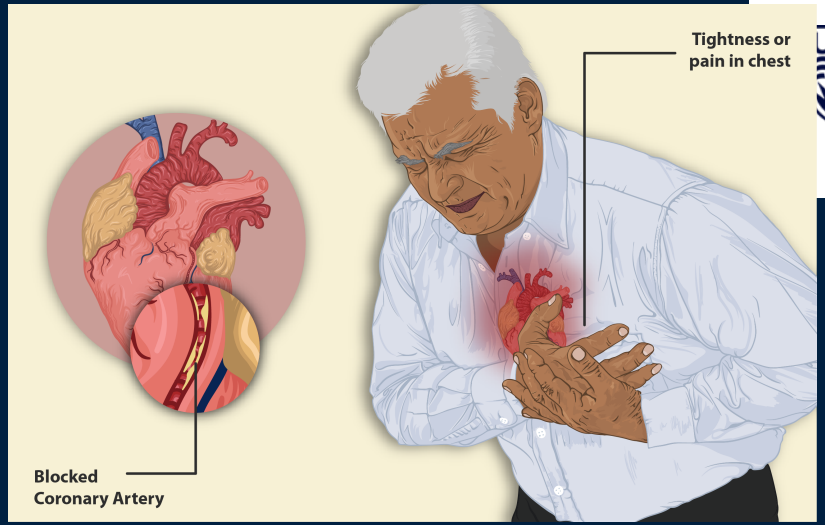
CAN EXERCISE IMPACT CAD?

YES – helps prevent heart attack + stroke

- Enhanced oxygen delivery to the heart muscle
- Decreased vascular resistance (modifies several factors)
- Improved blood oxygen capacity (more red blood cells)
- Reduces risk factors
- Reduces cardiovascular events + mortality
- Plaque regression or stabilization??

HEART ATTACK

Occurs when an artery supplying your heart muscle becomes blocked.



POLL:

Heart attack symptoms are similar in men and women??

a) Yes
b) No
c) Sort of?

POLL:

Heart attack symptoms are similar in men and women??

a) Yes
b) No
c) Sort of?

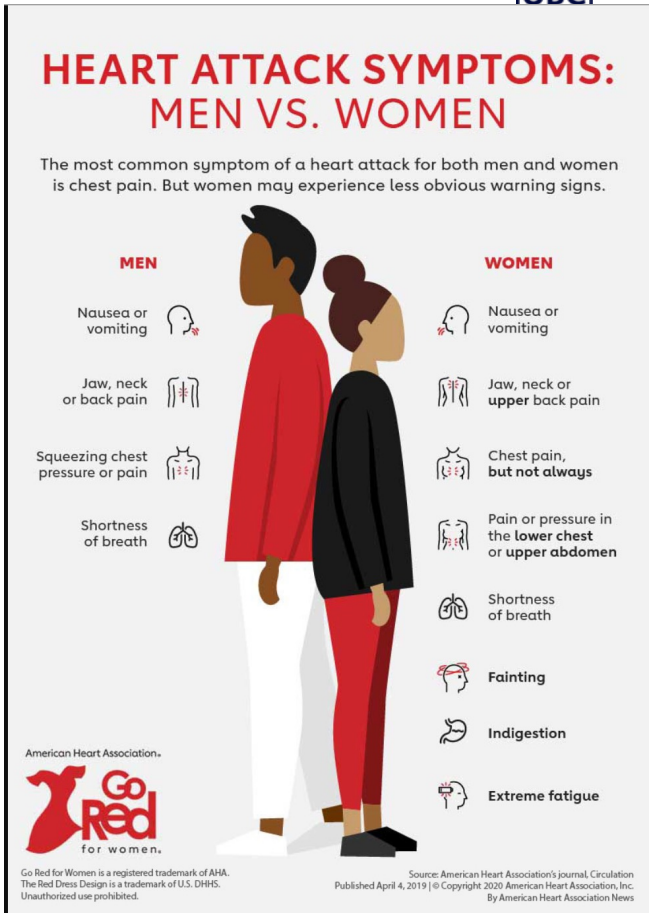
SYMPTOMS OF HEART ATTACK

Go to the emergency room immediately if you feel:

- Squeezing chest pressure or pain
- Pain radiating to jaw, neck, back, arms
- Nausea/vomiting
- Shortness of breath

Be mindful that symptoms are often **different** for women and **may not** include chest pain

- Pain radiating to upper back, lower chest, upper abdomen
- Fainting, indigestion, extreme fatigue



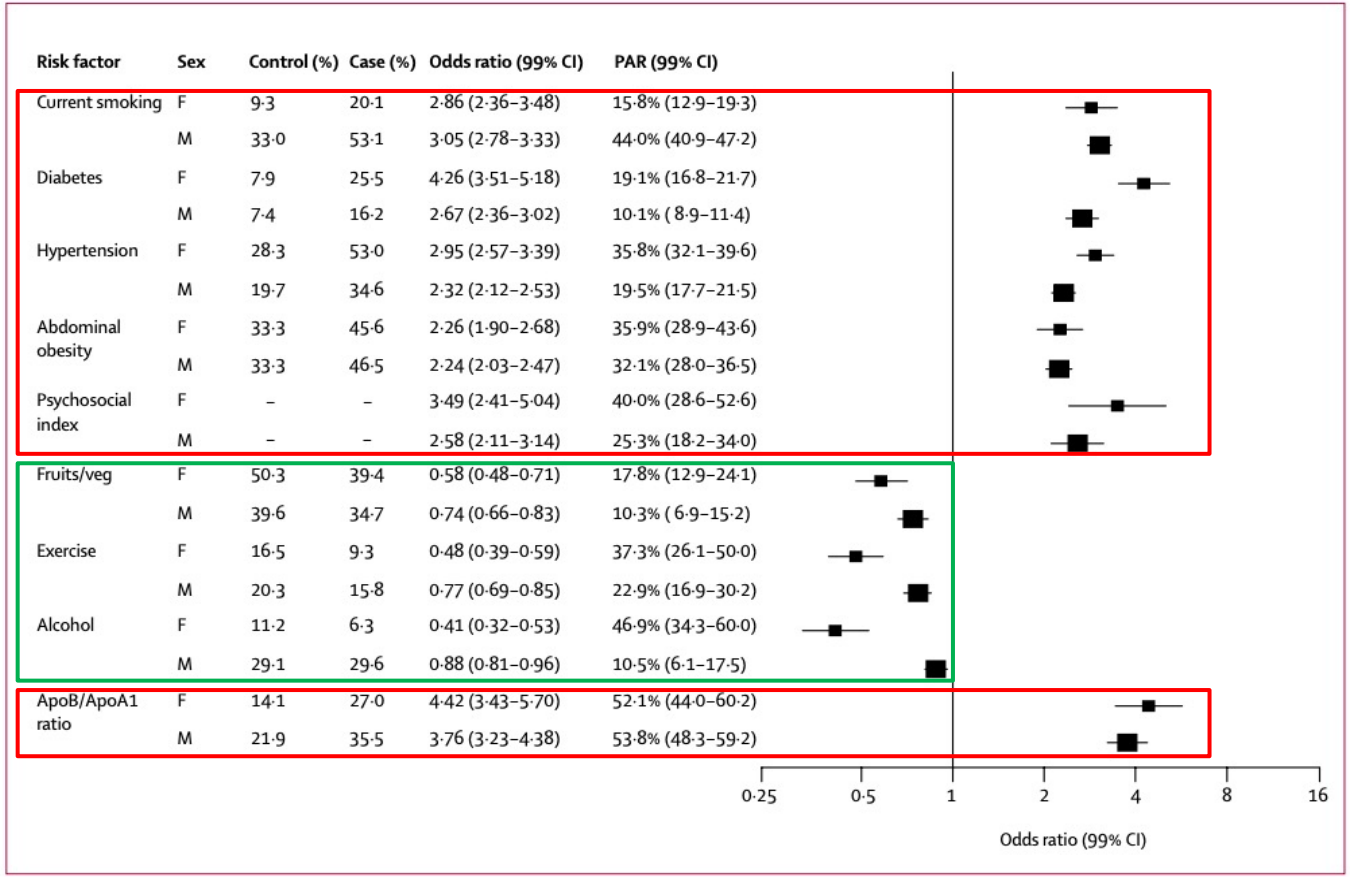
CAN EXERCISE PREVENT HEART ATTACK?

YES!

Evidence from INTERheart study.

Increase risk

Decrease risk



Risk factor	Sex	Control (%)	Case (%)	Odds ratio (99% CI)	PAR (99% CI)
Current smoking	F	9·3	20·1	2·86 (2·36–3·48)	15·8% (12·9–19·3)
	M	33·0	53·1	3·05 (2·78–3·33)	44·0% (40·9–47·2)
Diabetes	F	7·9	25·5	4·26 (3·51–5·18)	19·1% (16·8–21·7)
	M	7·4	16·2	2·67 (2·36–3·02)	10·1% (8·9–11·4)
Hypertension	F	28·3	53·0	2·95 (2·57–3·39)	35·8% (32·1–39·6)
	M	19·7	34·6	2·32 (2·12–2·53)	19·5% (17·7–21·5)
Abdominal obesity	F	33·3	45·6	2·26 (1·90–2·68)	35·9% (28·9–43·6)
	M	33·3	46·5	2·24 (2·03–2·47)	32·1% (28·0–36·5)
Psychosocial index	F	–	–	3·49 (2·41–5·04)	40·0% (28·6–52·6)
	M	–	–	2·58 (2·11–3·14)	25·3% (18·2–34·0)
Fruits/veg	F	50·3	39·4	0·58 (0·48–0·71)	17·8% (12·9–24·1)
	M	39·6	34·7	0·74 (0·66–0·83)	10·3% (6·9–15·2)
Exercise	F	16·5	9·3	0·48 (0·39–0·59)	37·3% (26·1–50·0)
	M	20·3	15·8	0·77 (0·69–0·85)	22·9% (16·9–30·2)
Alcohol	F	11·2	6·3	0·41 (0·32–0·53)	46·9% (34·3–60·0)
	M	29·1	29·6	0·88 (0·81–0·96)	10·5% (6·1–17·5)
ApoB/ApoA1 ratio	F	14·1	27·0	4·42 (3·43–5·70)	52·1% (44·0–60·2)
	M	21·9	35·5	3·76 (3·23–4·38)	53·8% (48·3–59·2)

CAN EXERCISE PREVENT ANOTHER HEART ATTACK?

YES! – the basis of cardiac rehab is exercise.

- Improve exercise capacity
- Improve lipid profile
- Reduce weight
- Improve mental health
- Reduced overall morbidity and mortality

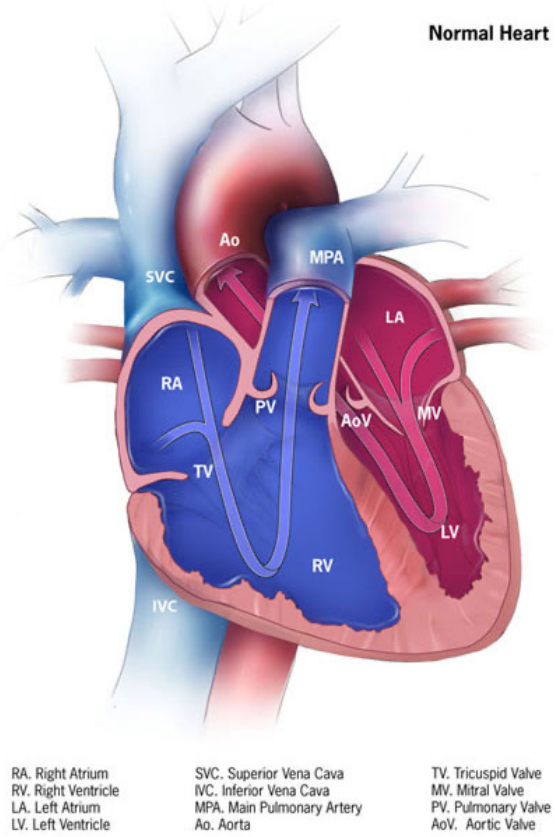
HEART FAILURE

A chronic and progressive condition in which the heart muscle is unable to pump enough blood to meet the body's needs for blood and oxygen.

WHAT DOES YOUR HEART LOOK LIKE

Blue = deoxygenated blood from body going to lungs

Red = oxygenated blood from lungs, going to body



WHAT HAPPENS IN HEART FAILURE?

The heart isn't pumping like it should → can't meet the body's need for oxygen.

- Often follows other cardiac conditions that put additional stress on the heart: coronary artery disease, past heart attack, hypertension, severe lung disease, diabetes, obesity etc.

- Temporary solution: Heart tries to compensate to pump out more blood → chambers enlarge, heart muscle thickens and heart rate increases

CAN EXERCISE IMPACT HEART FAILURE?

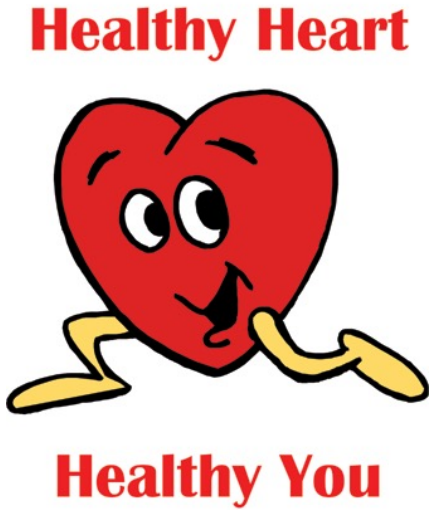
YES, it can improve quality of life and symptoms.

- Improves cardiorespiratory fitness → less likely to be short of breath
- Causes weight loss
- Reduced hospitalization

HEART HEALTH EXERCISE PRESCRIPTION

Aerobic – at least 150min/week, ideally moderate to vigorous intensity

- Walking (make sure you get your heart rate up!)
- Running
- Cycling
- Swimming etc.



Strength training 2-3x/week

- 8-10 exercises working major muscle groups
- 2-4 sets with 6-12 repetitions of each exercise.

Stretching

BREAK TIME FOR 10 MIN!

FILL OUT OUR RESEARCH SURVEY IF YOU HAVEN'T ALREADY!

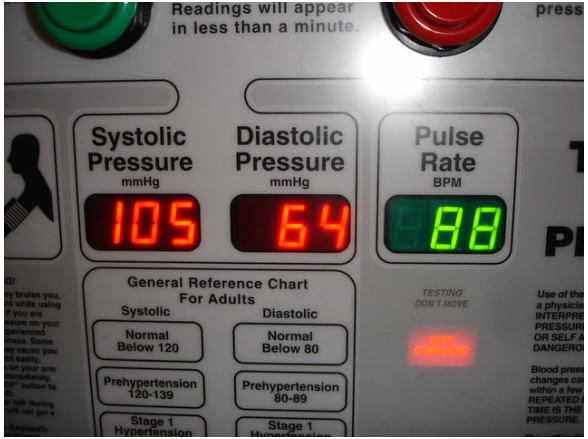
HTTPS://UBC.CA1.QUALTRICS.COM/JFE/FORM/SV_3PUVZJ8M6QBGJJ4

HYPERTENSION

When the pressure of your blood against your arteries is higher than normal. Typically defined as >140/90mmHg.

A FEW KEY TERMS

- **Systolic blood pressure** = pressure on your arteries as your heart contracts
- **Diastolic blood pressure** = pressure on your arteries as your heart relaxes



- **Main determinants of blood pressure:**
  - Stroke volume x heart rate x peripheral resistance

WHAT HAPPENS TO THE ARTERIES

- Overtime, they lose their elasticity and can thicken and harden.

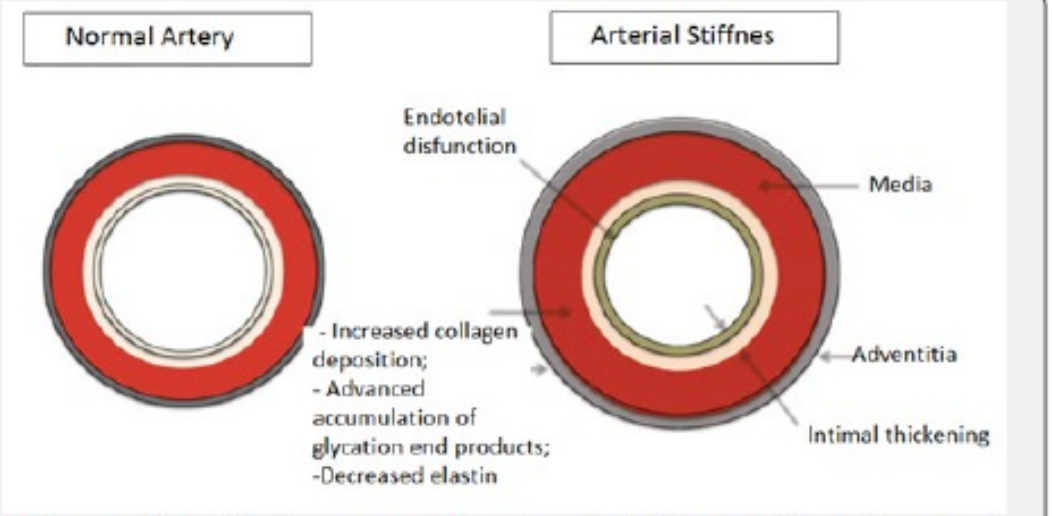


Figure 2: Multiple causes of arterial stiffness with aging and disease. Adapted from Fleenor and Berrones [46].

WHAT ELSE ELEVATES BLOOD PRESSURE?

- High Salt consumption >2000mg/day
- Low potassium consumption
- Caffeine
- Alcohol (>14 drinks/week for men, >9/week for women)
- Smoking
- Stress
- Obesity
- Chronic conditions (kidney disease, diabetes, sleep apnea)
- **PHYSICAL INACTIVITY**

CAN EXERCISE PREVENT HYPERTENSION?

YES!

- Exercise reduces blood pressure in healthy people, and people with prehypertension (120-139/80-89mmHg)

- Targets risk factors (physical inactivity, obesity, diabetes, stress etc)

POLL:

True or False: Exercise can be as effective at lowering blood pressure as medication.

a) True

b) False

POLL:

True or False: Exercise can be as effective at lowering blood pressure as medication.

a) True

b) False

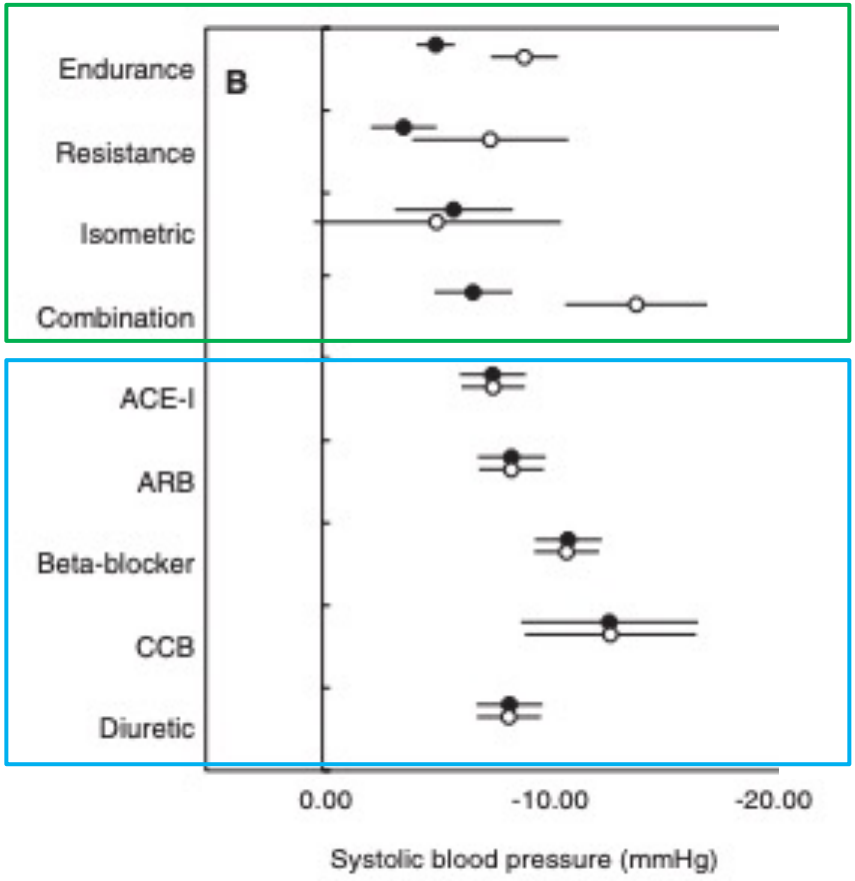
EXERCISE VS MEDICATION

●= all populations

○ = just systolic BP >140mmHg (ie. Hypertensive)

Green = Exercise

Blue = Medication



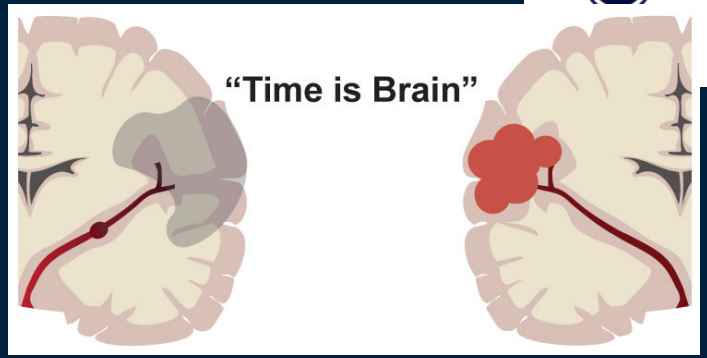
DOES EXERCISE REDUCE BLOOD PRESSURE?

YES!!

- Regular exercise (3-5 sessions per week) can reduce systolic blood pressure between 5-15mmHg, similar to the amount blood pressure would be reduced with one medication
- Reductions seen among all exercise types (aerobic vs resistance), with potentially greater reductions if you combine the two.
- Helps target risk factors

STROKE

When the blood supply to part of your brain is interrupted or reduced, preventing brain tissue from getting oxygen and nutrients.



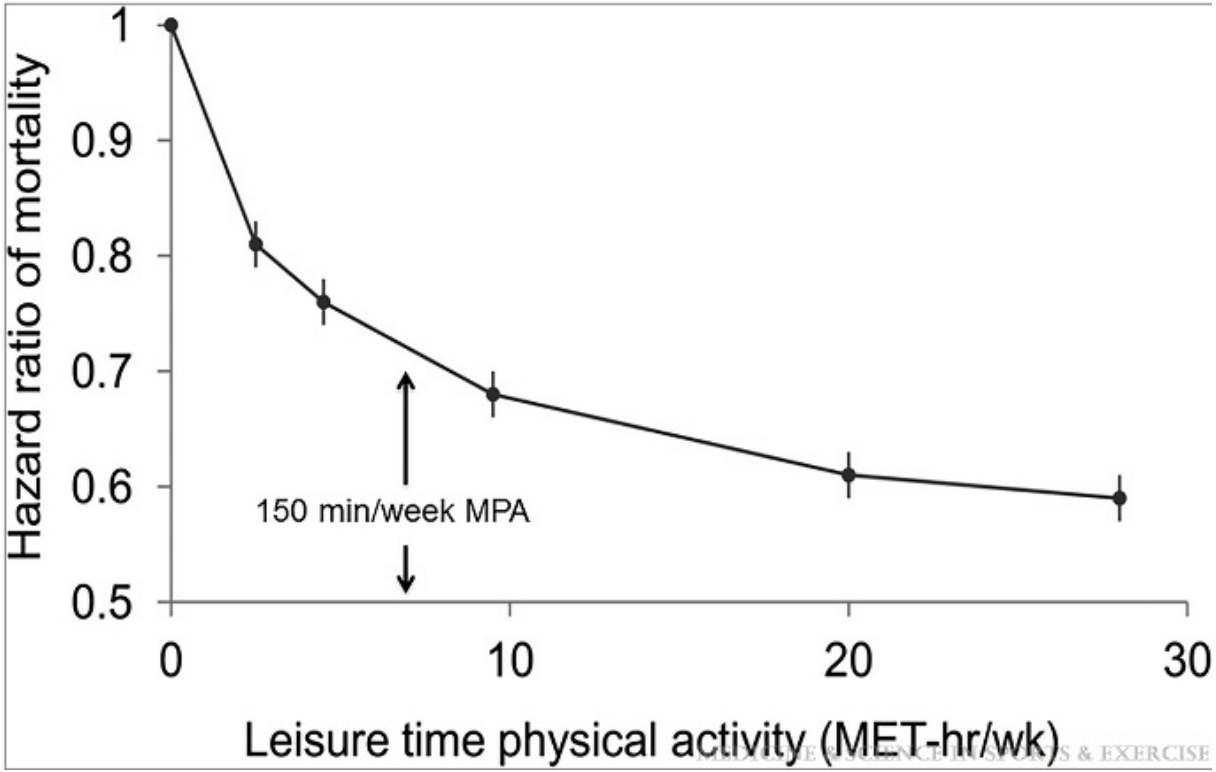
SYMPTOMS OF STROKE

CAN EXERCISE PREVENT STROKE?

YES!!: Similar to other cardiovascular diseases

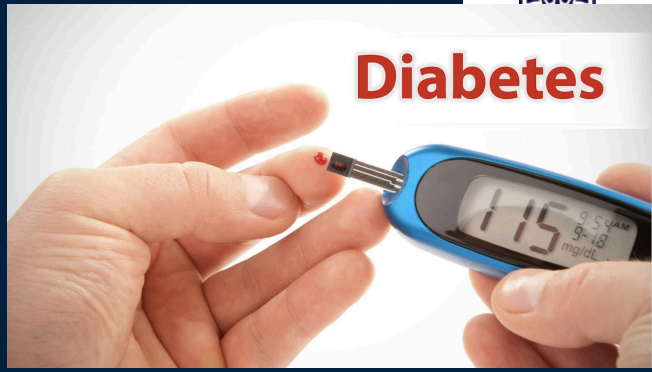
- Meeting guidelines reduces your risk of stroke and subsequent mortality
- Targets risk factors
- Prevents another stroke

HOW MUCH EXERCISE DO I NEED?



DIABETES MELLITUS

A metabolic disease that causes high blood sugar due to issues with insulin.



TYPE 1 VS TYPE 2 DIABETES

- **Type 1 diabetes**: autoimmune destruction of pancreatic cells that produce insulin → body doesn't produce enough insulin
  - Treatment: insulin

- **Type 2 diabetes:** pancreas doesn't produce enough insulin, or your body doesn't properly use the insulin it makes
  - Treatment: medications (including insulin), lifestyle modification

- **Other types:** gestational, medication induced etc.

WHAT LEADS TO HIGH BLOOD SUGAR

- Body has three energy choices: fat, carbohydrates, protein
  - Amount produced depends on what you eat

- Insulin reduces your blood sugar to normal levels by telling the tissues to take up glucose from the bloodstream.

- <u>Tests for diabetes:</u>
  - Fasting plasma glucose (normal = 4-7mmol/L)
  - A1C (normal = <7%)

DOES EXERCISE PREVENT DIABETES (TYPE2)

Yes

- Type 2 diabetes is highly associated with modifiable risk factors – diet, exercise, weight etc.

- Helps reduce weight (or visceral obesity)

- Exercise helps consume glucose – removing it from the bloodstream

CAN EXERCISE TREAT DIABETES (TYPE 2)

It can help!

- Exercise increases glucose uptake from muscle cells independently of insulin → lowers blood sugar, even if insulin is not working properly

- Lower risk of diabetic complications – eyes, heart, kidneys

- Also helps mitigate risk factors

WHAT TYPE OF EXERCISE SHOULD I DO?

Aerobic exercise: at least 150 min/week, divided into 3-7 sessions

- Brisk walking
- Running, cycling
- Swimming etc

Resistance Exercise:

- 6-8 exercises, increase to 12 overtime
- Major muscle groups – arms, back, legs
- Body weight, bands, dumbbells, machines etc

SAMPLE AEROBIC PROGRESSION

Program Stage	Week	Frequency (days/ week)	Intensity		Duration (min)
			Exertion Level	RPE (10 pt)	
Improvement	1 - 4	4	Somewhat hard	4	25 - 30
	5 - 7	4	Somewhat hard	4	30 - 35
	8 - 10	4	Somewhat hard	4	35 - 40
	11 - 13	4	Somewhat hard - Hard	4 - 5	40 - 45
	14 - 16	4 - 5	Somewhat hard - Hard	4 - 5	45 - 50
	17 - 20	4 - 5	Hard	5 - 6	50 - 55
	21 - 24	4 - 5	Hard	5 - 6	55 - 60
Maintenance	25 +	4 - 5 +	Moderate - Hard	4 - 6	30 - 60

Table adapted from: Warburton, et al. 2006

Rating of perceived exertion scale

0	Rest
1	Very light
2	Light
3	Moderate
4	Somewhat hard
5	Hard (breathing deeply)
6	
7	Very hard (out of breath)
8	
9	
10	Maximal

Intensity is Important

Light (RPE 1 - 2)
easy walking, golf, gardening, dusting, laundry, stretching, yoga, curling, bowling

Moderate (RPE 3 - 6)
brisk walking, climbing stairs, mowing the lawn, swimming, dancing, biking

Vigorous* (RPE ≥ 7)
running, fast cycling, hockey, basketball, gym workouts

SAMPLE RESISTANCE WORKOUT

Begin with 6-8 exercises. As you feel comfortable, add 1-2 exercises a week (up to 12 exercises).

☐ Hips & Thighs

1

Start: Sit at the front of the chair, chest up, and feet hip width apart. Slowly lift out of the chair with your knees directly over your toes. Keep your back straight and arms out.
Finish: Hold the top position with knees bent. Slowly bend knees to lower yourself to the chair. Don't drop to the chair.

☐ Chest

2

Start: Place the band around your upper back. Grab the ends of the band with elbows bent and palms facing down or inward.
Finish: Press out, extending your elbows forward to shoulder level. Slowly return to starting position.

☐ Upper Back

3

Start: Grasp the band with both hands in front of your chest with the elbows slightly bent and shoulders down.
Finish: Keep elbows slightly bent and pull band outward until the band reaches across your middle chest. Hold the end position briefly, squeezing the shoulder blades together. Slowly return to starting position.

☐ Middle Back

4

Start: Wrap the middle of the band around an extended foot. Grasp both ends of the band at the outside of your knee with your outside hand.
Finish: Pull band backwards and slightly up until your outside hand is beside your ribcage. Pause. Slowly lower to starting position.

☐ Shoulders

5

Start: One foot and hand anchor one end of the band. The other hand is beside the shoulder grasping the band, hand level with the chin, and arm straight up from the floor.
Finish: Extend the arm overhead until directly over the shoulder. Try not to lean to one side. Pause. Slowly lower to starting position.

☐ Shoulders

6

Start: Anchor as per #5 with slightly shorter band. Grasp the band at position just outside the knee. Can have palm down or palm forward (easier on the shoulders).
Finish: Lift arm to side with elbow slightly bent. Lift to shoulder height or slightly below shoulder height if you have shoulder problems. Pause. Slowly lower to starting position.

☐ Upper Arm – Front

7

Start: Keep same anchor position as #6, except slightly shorter band length. Grasp band with palm facing up.
Finish: Curl hand to shoulder keeping your elbow at your side at the lower ribs. Pause. Slowly lower to starting position.

☐ Upper Arm – Back

8

Start: Seated at the front edge of the chair and chest up. Place the band around your knee, anchoring the band with one hand on the opposite thigh and holding the other end of the band down at your side with your elbow bent.
Finish: Extend your elbow until your arm is straight down by your side. Pause. Slowly return to starting position.

☐ Legs – Front

9

Start: Tie the band in a knot and wrap around your feet, or tie the band around one leg of the chair with your foot through the loop.
Finish: Extend one leg out, keeping your knee in the same position. Keep your posture. Pause. Slowly return to starting position.

☐ Legs – Back

10

Start: Stand behind the chair holding the back for support. Wrap the tied band around your ankles, or tie the band around a leg of the chair with your foot through the loop.
Finish: Curl one ankle up. Keep the knee in the same position and your back stable. Pause. Slowly return to starting position.

☐ Lower Back

11

Start: Stand behind the chair holding the back for support, with knees slightly bent, and leaning forward with back straight. You can wrap a band around your ankles, or do the exercise without a band.
Finish: Extend one leg out so that it is in line with your body. Don't over-extend the leg or arch in the low back. Pause. Slowly return to starting position.

☐ Abdominals

12

Start: Seated comfortably in the chair, chest up, and both knees bent with the feet on the ground in front of you.
Finish: Lift one knee so that it is higher than the opposite knee, or slightly rock back with both feet on the ground. Tighten your abdominals. Keep your chest up. Pause. Slowly return to starting position.

EXERCISE TIPS

- The best type of exercise is the one that you will do
- Any movement is better than no movement
- Prevent injuries
    - Start low and go slow
    - Get the right equipment and get it properly fitted
    - Learn proper technique
- Bring a friend!
- Schedule it into your calendars
- Set goals (and reward yourself when you meet them ☺)
- Have fun!!

HELPFUL RESOURCES

- www.sportmedbc.com
- https://www.healthlinkbc.ca/physical-activity
- Community centers, walking/running/cycling groups (ie. Running room), personal trainers etc.
- Workout apps (ie. Nike Training Club)
- Learn to Walk or Learn to Run 10K (Vancouver Sun Run)

http://guidelines.diabetes.ca/patient-resources

FUTURE TALKS

- Thursday May 20 at 9:30AM : Vascular Disease. (Nicole)
- Tuesday May 25 at 9:30AM : Exercise Talk 3: Cancer + Mental Health. (Julia)
- Thursday May 27 at 9:30AM : Nature. (Alexandra)
- Tuesday June 1 at 9:30AM : Prehabilitation prior to Surgery. (Nicole)

We hope to see you there!

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Thank you!

Any questions?